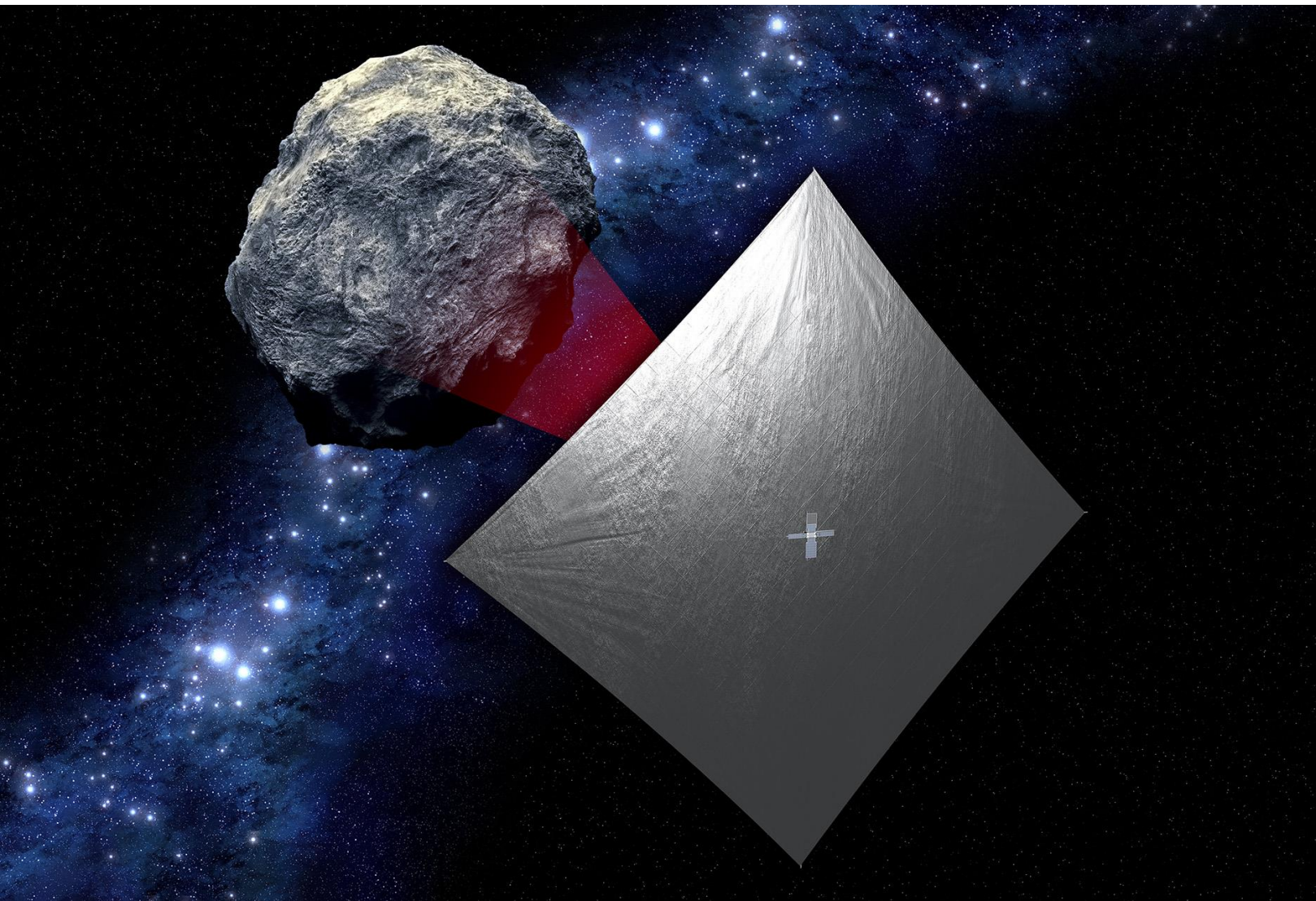


Near Earth Asteroid (NEA) Scout



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Near Earth Asteroid Scout

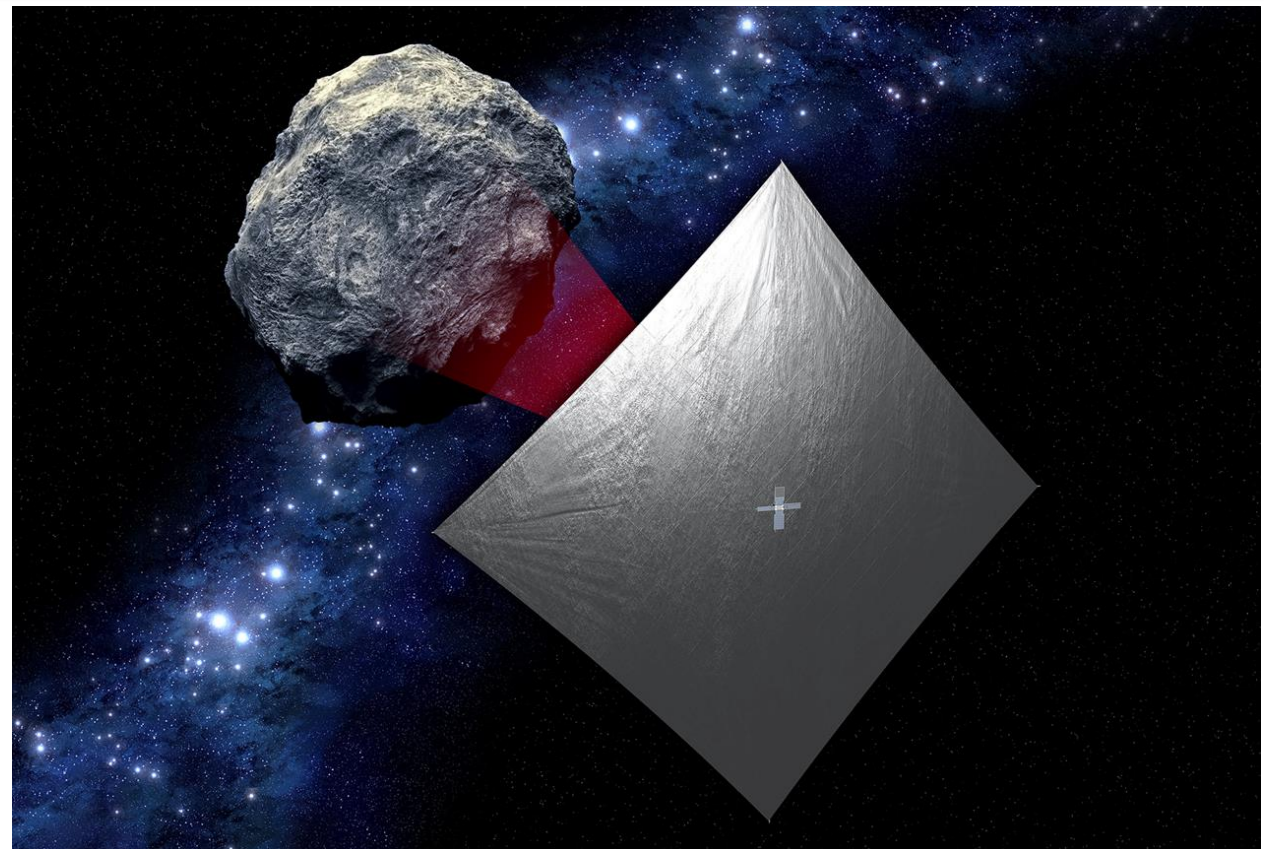


The Near Earth Asteroid Scout Will

- Image/characterize a NEA during a slow flyby
- Demonstrate a low cost asteroid reconnaissance capability

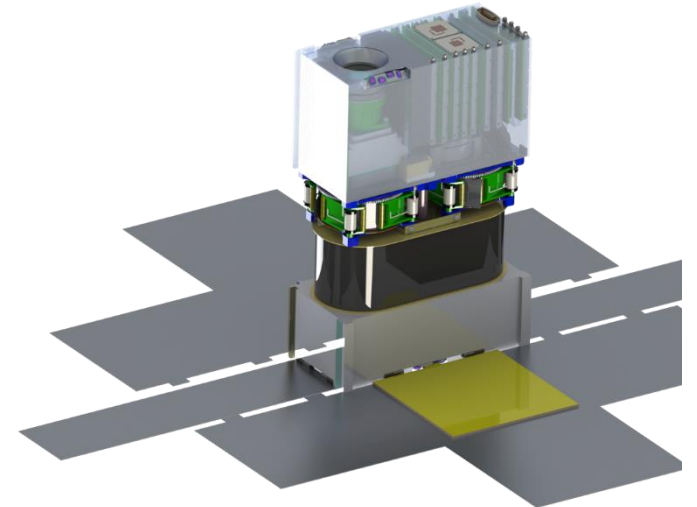
Key Spacecraft & Mission Parameters

- 6U cubesat (20cm X 10cm X 30 cm)
- ~86 m² solar sail propulsion system
- Manifested for launch on the Space Launch System (EM-1/2019)
- 1 AU maximum distance from Earth

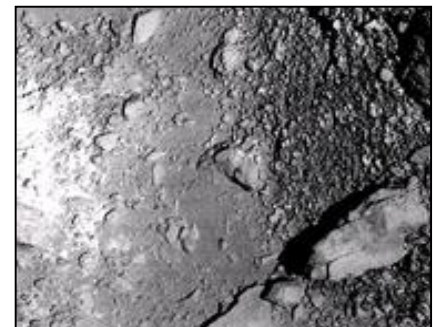


Leverages: combined experiences of MSFC and JPL with support from GSFC, JSC, & LaRC

Close Proximity Imaging
Local scale morphology, terrain properties, landing site survey

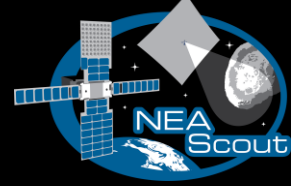


Target Reconnaissance with medium field imaging
Shape, spin, and local environment





NEA Scout Goals & Objectives



- 1) Design, develop, integrate and operate a spacecraft for the purpose of demonstrating a low cost reconnaissance capability
- 2) Enable asteroids as potential destinations for human exploration
- 3) Characterize a candidate NEA with an imager to address key SKG's

“Precursor robotics, robotic missions that investigate candidate destinations and provide vital information to prepare for human explorers, will lay the groundwork for humans to achieve new milestones in deep space.”

**HEOMD/AES Strategic Goals/Objectives
(Strategic Goal 1, Objective 1.1)**

“Robotic exploration is the principal method we use to explore the solar system, and is an essential precursor to human exploration of space.”

**SMD Strategic Goals/Objectives
(Strategic Goal 1, Objective 1.5)**



Baseline Target Asteroid: 1991 VG



- Diameter ~ 5-12 meters
- Albedo is unknown
- Position is known within 2700 km ($1-\sigma$) but optical observation opportunity in July '17 will decrease uncertainty to a few 100s km
- Rotation period between a few minutes and less than 1 hour
- Unlikely to have a companion
- Unlikely to retain an exosphere or dust cloud
 - Solar radiation pressure sweeps dust on timescales of hours or day



Near Earth Asteroid Scout Mission Overview



Close Proximity Science
 High-resolution imaging,
 10 /px over >30% surface
SKGs: Local morphology
Regolith properties

NEA Reconnaissance
 <100 km distance at encounter
 50 cm/px resolution over 80% surface
SKGs: volume, global shape, spin
properties, local environment

Target Detection and Approach:
 50K km, Light source observation
SKGs: Ephemeris determination and
composition assessment

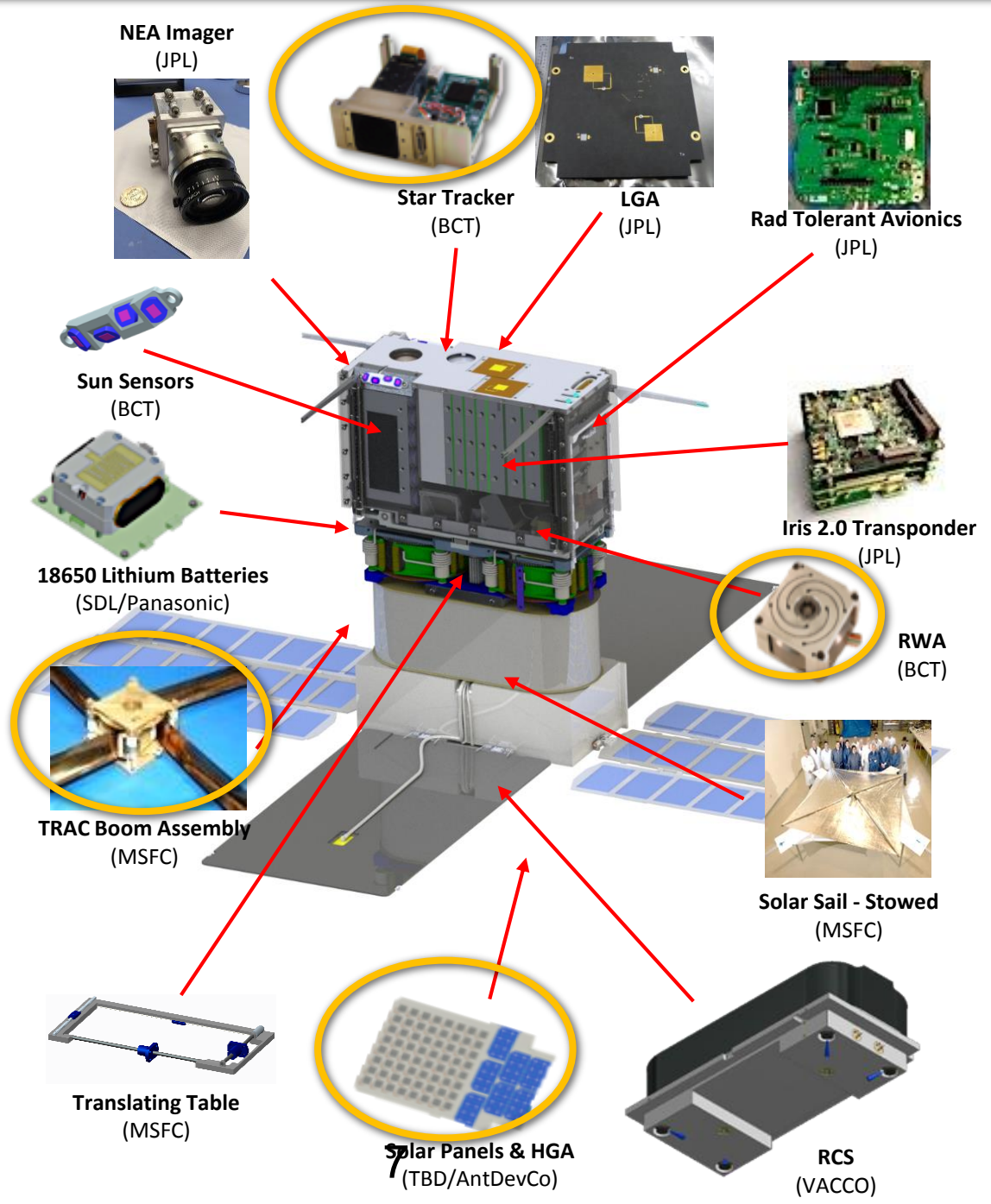
JPL IntelliCam)



Flight System Overview



Payload	<ul style="list-style-type: none"> Context Camera
Mechanical & Structure	<ul style="list-style-type: none"> "6U" CubeSat form factor <14 kg total launch mass Modular flight system concept
Propulsion	<ul style="list-style-type: none"> ~86 m² aluminized CP-1 solar sail (based on NanoSail-D2)
Avionics	<ul style="list-style-type: none"> Radiation tolerant architecture
Electrical Power System	<ul style="list-style-type: none"> Trifold deployable solar arrays with GaAs cells (~51.2 W EOL at 1 AU solar distance) 6.2 Ah Battery 10 -12.3 V unregulated, 5 V/3.5 V regulated
Telecom	<ul style="list-style-type: none"> JPL Iris 2.0 X-Band Transponder; 4 W RF output power supports doppler, ranging, and D-DOR 2 pairs of INSPIRE-heritage LGAs (RX/TX) 8x8 element microstrip array HGA (TX); ~1 kbps to 34m DSN at 0.8 AU
Attitude Control System	<ul style="list-style-type: none"> 15 mNm-s (x3) & 100 mNm-s RWAs Active mass translation system VACCO R-236fa (refrigerant gas) 'warm gas' RCS system Nano StarTracker, Coarse Sun Sensors & MEMS IMU for attitude determination



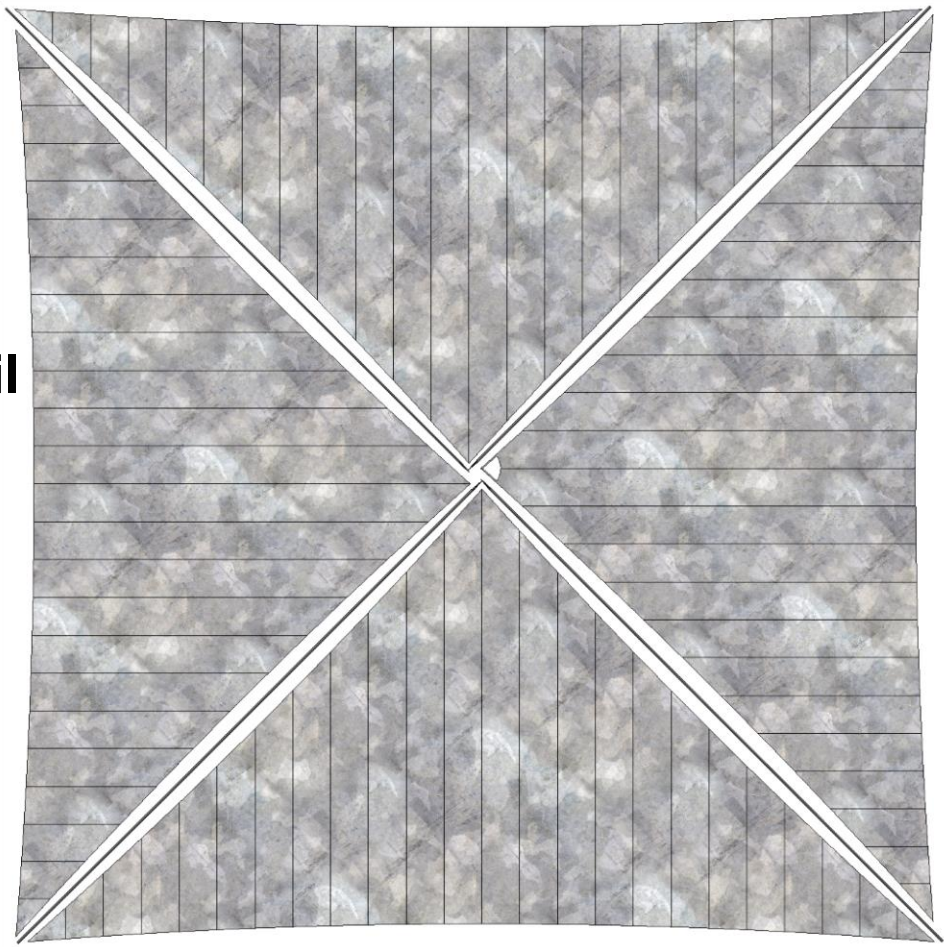
A fully functional planetary spacecraft in a shoebox



NEA Scout Approximate Scale



Deployed Solar Sail



School Bus



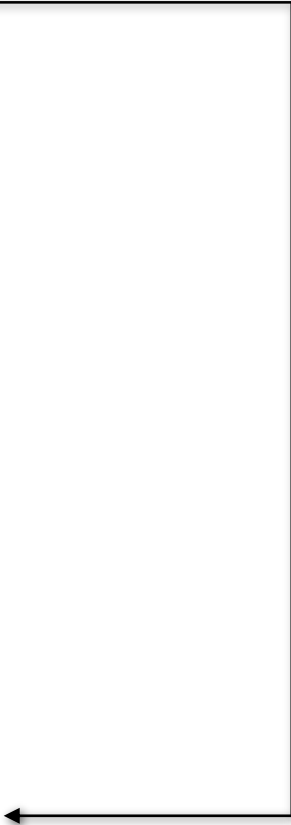
Human



6U Stowed Flight System

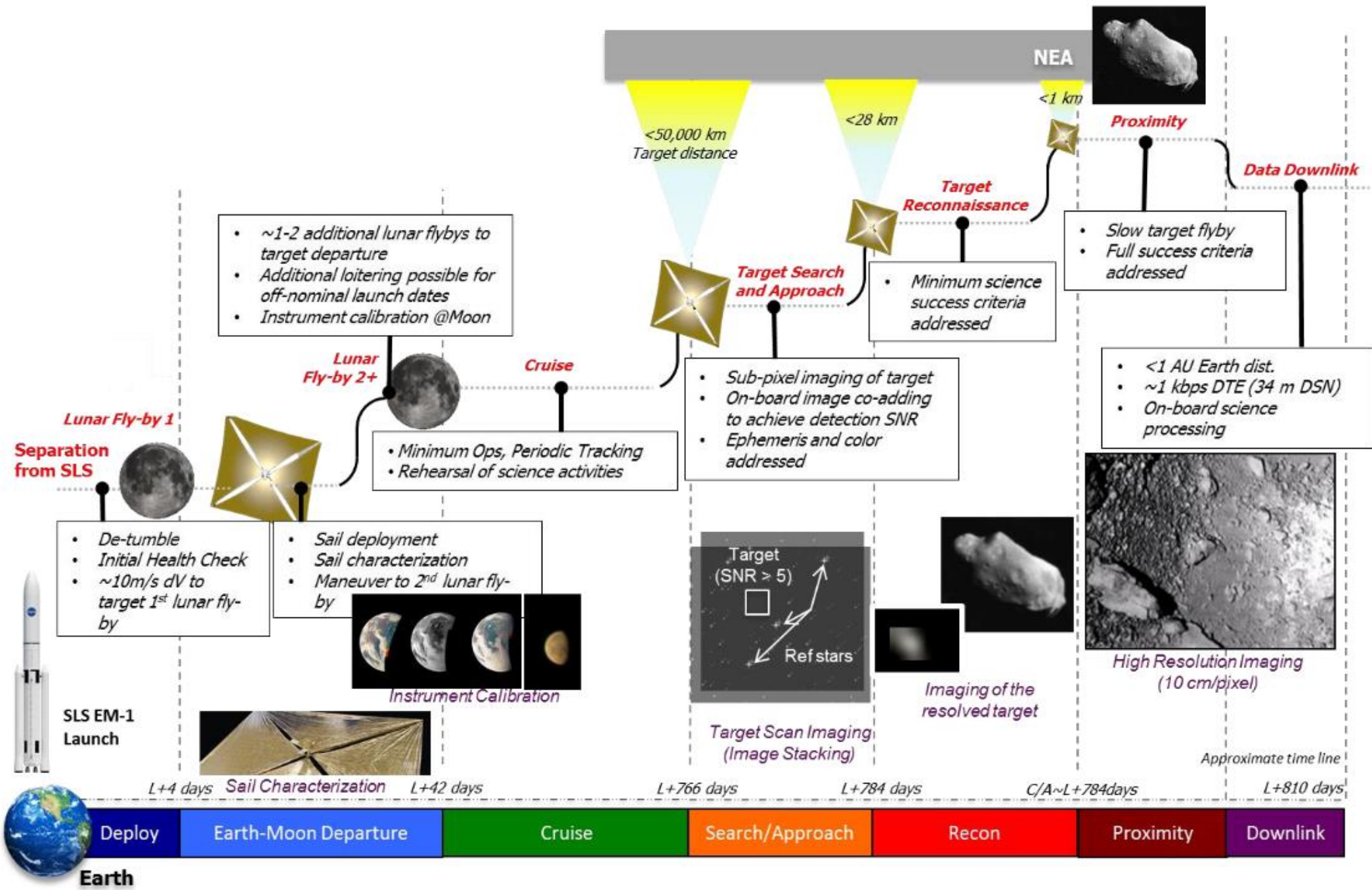
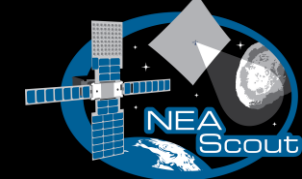


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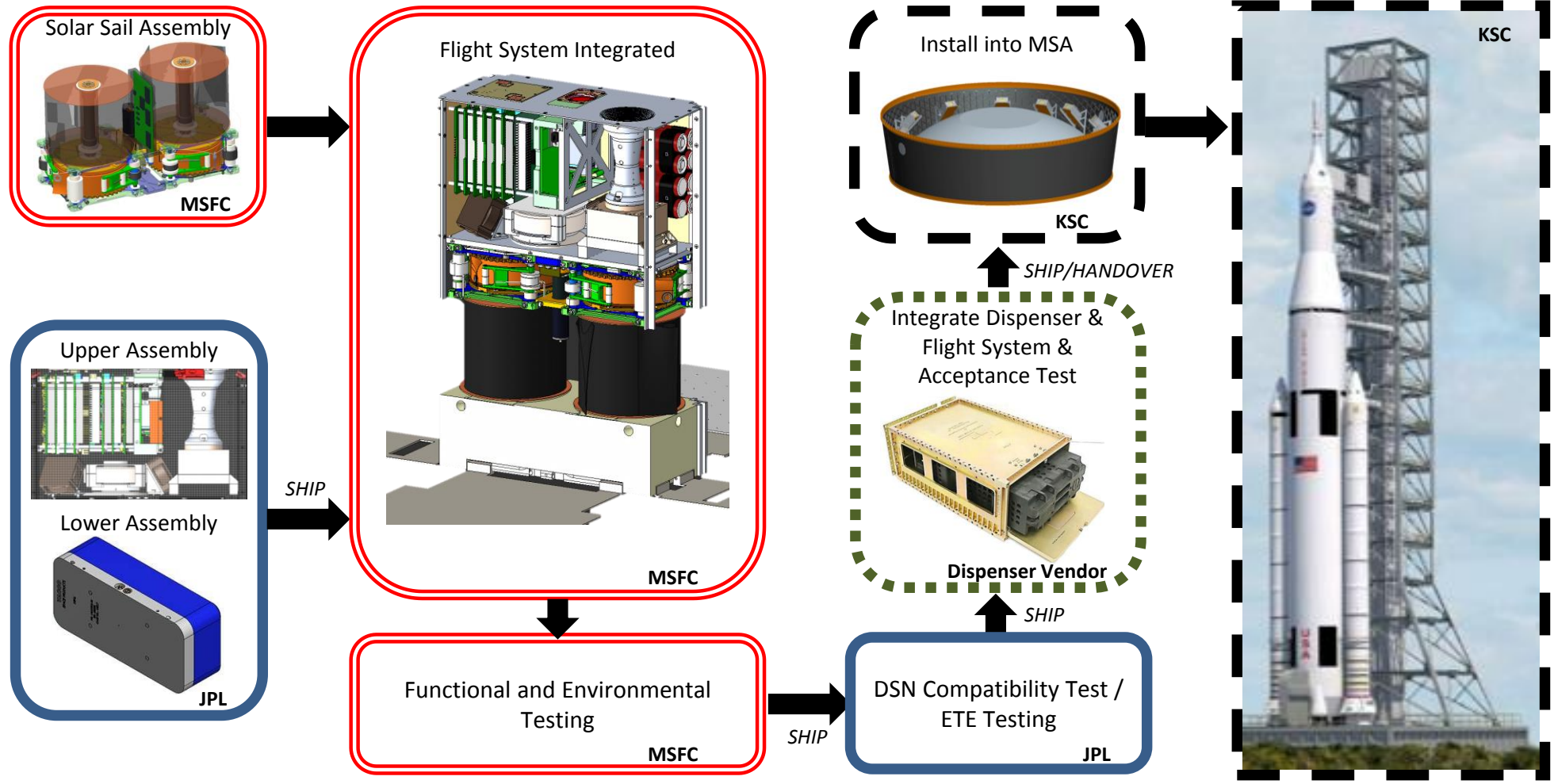


Concept of Operations Overview



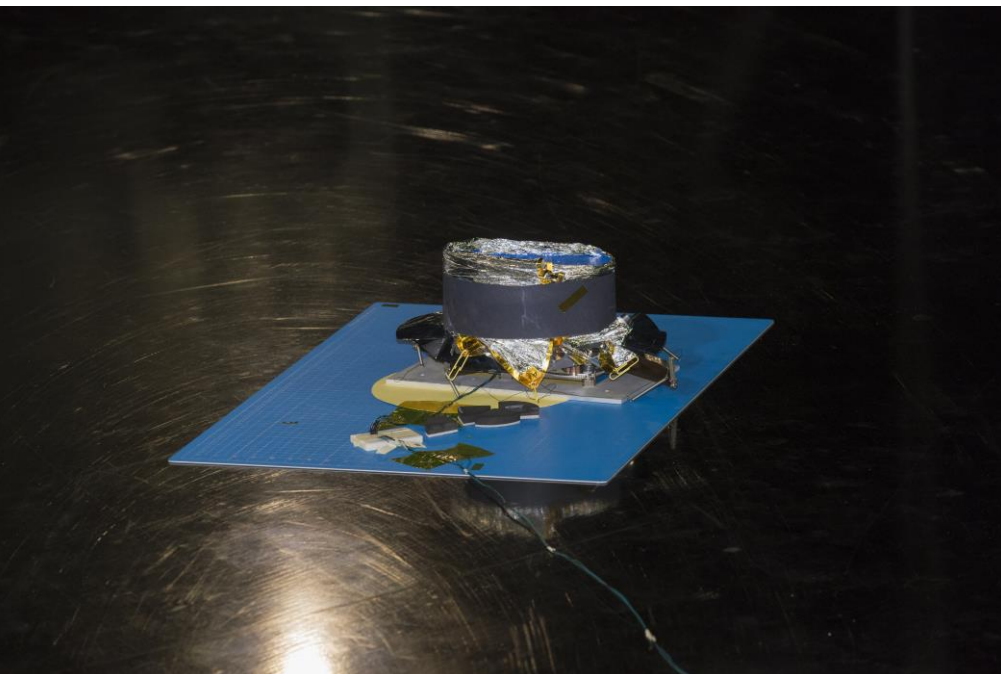
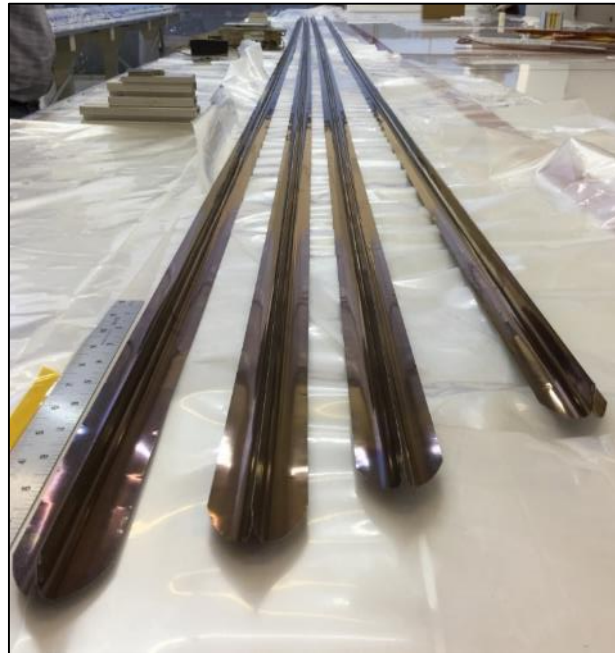


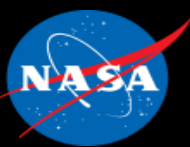
Assembly, Integration, and Test (AI&T) Overview



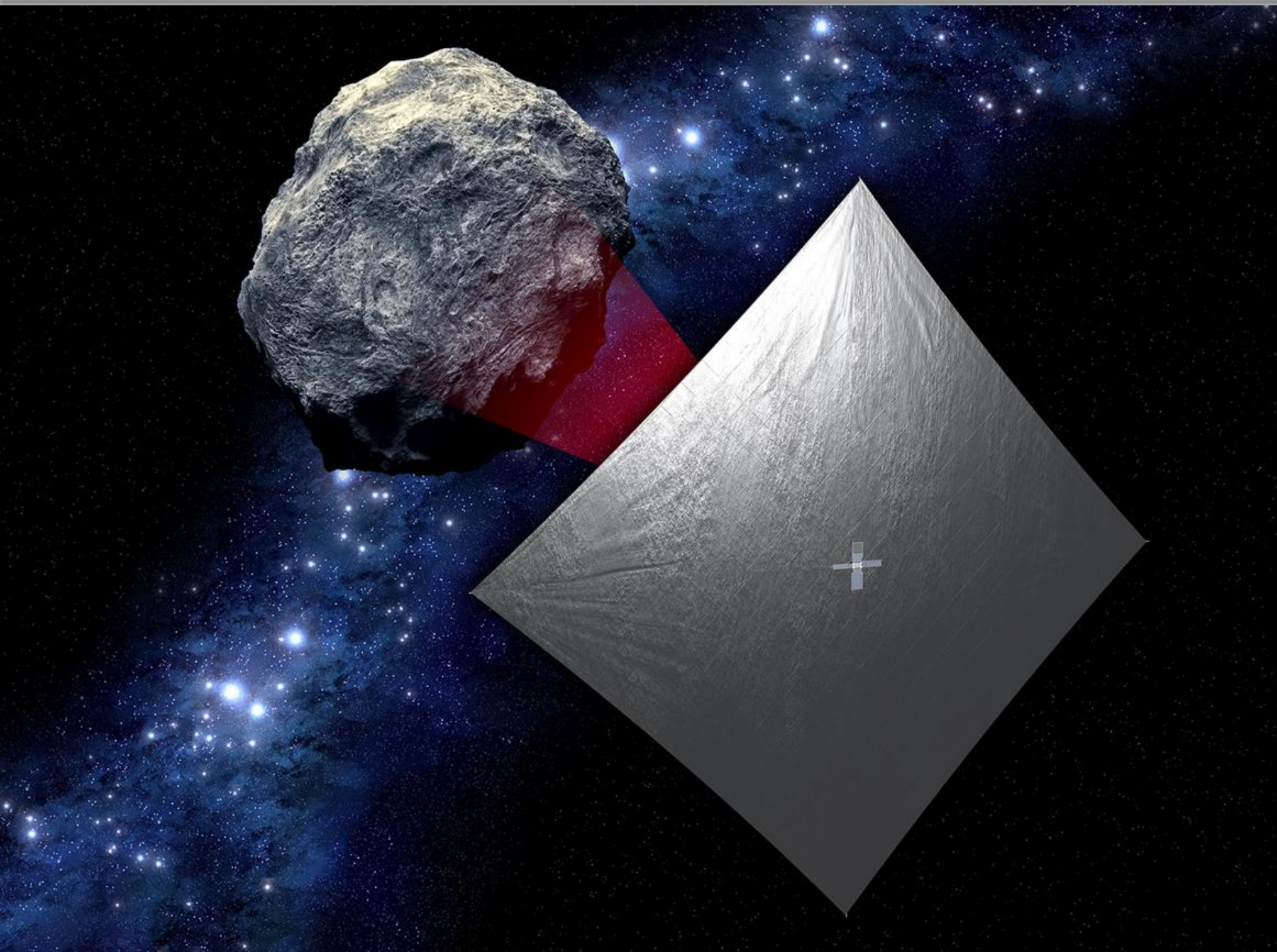


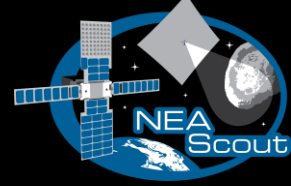
On Schedule to Deliver Spacecraft in 2018





Questions?





Backup Information